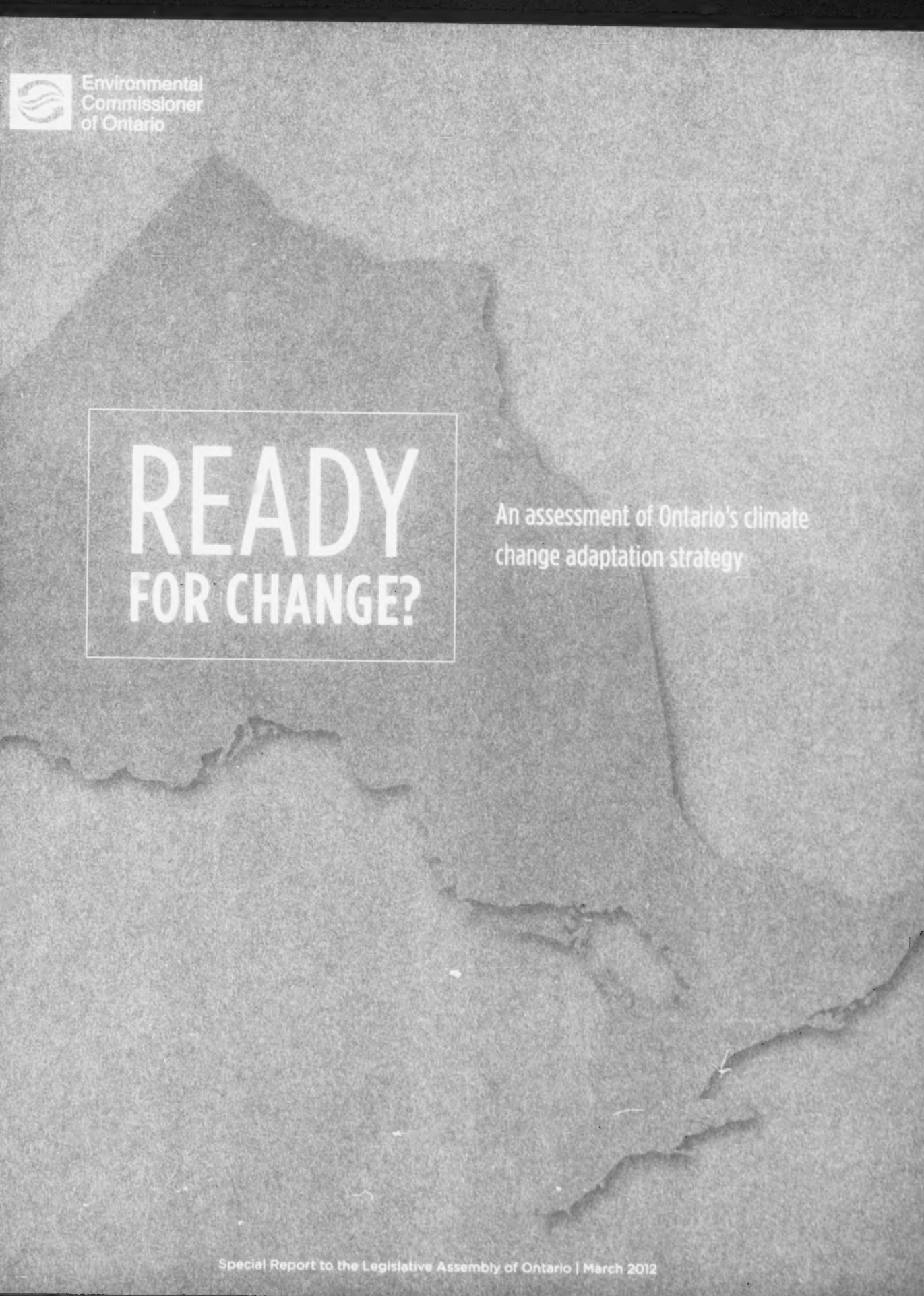
Environmental
Commissioner
of Ontario

READY FOR CHANGE?

An assessment of Ontario's climate change adaptation strategy

Special Report to the Legislative Assembly of Ontario | March 2012



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Environmental
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Commissaire à
l'environnement
de l'Ontario

Gord Miller, B.Sc., M.Sc.
Commissioner

Gord Miller, B.Sc., M.Sc.
Commissaire

March 7, 2012

The Honorable Dave Levac
Speaker of the Legislative Assembly of Ontario
Room 180, Legislative Building
Legislative Assembly
Province of Ontario
Queen's Park

Dear Speaker:

In accordance with Section 58(4) of the *Environmental Bill of Rights, 1993*, I present the attached Special Report of the Environmental Commissioner of Ontario for your submission to the Legislative Assembly of Ontario. This Special Report is my independent review of the Ontario government's climate change adaptation strategy and action plan – Climate Ready – released in April 2011.

Sincerely,

Gord Miller
Environmental Commissioner of Ontario

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INTRODUCTION

Climate change is one of the defining issues of our time. While the climate has naturally fluctuated throughout Earth's history, the current rate and magnitude of change is unprecedented. For the past 150 years, trillions of tonnes of carbon dioxide and other greenhouse gases (GHGs) have been released into the atmosphere largely as a result of the burning of fossil fuels and other human activities.

We are now experiencing the effects of this rapid release of carbon and will need to contend with these impacts well into the future. Higher temperatures, along with an increase in the frequency and severity of intense weather events such as ice storms, heavy rains, heat waves, droughts and wind storms, are all projected for Ontario.

Research co-ordinated by the Applied Research and Development Branch of the Ministry of Natural Resources (MNR) is providing a much clearer sense of how climate change is affecting Ontario now and how these impacts will intensify over the next 30 years and beyond.[1] As temperatures increase across the province, warmer climate conditions will expand northward.[2] Not all the indigenous plants and animals traditionally suited for cooler conditions may be capable of adapting to such change. While some species may thrive, others will not, and certain rare or endangered species

may be lost altogether. The ecological repercussions and impacts on Ontario's biodiversity are expected to be significant and permanent.

Mitigation efforts that reduce greenhouse gas releases constitute the first line of defense against these impacts. However, historical emissions already present in the atmosphere will continue to cause a slow and inexorable increase in global temperatures long into the future. Our current provincial and local infrastructure, programs and services were not designed to address these climatic changes nor the ecological disruptions they will produce. From emergency services to water management to forest fire fighting, how will Ontario handle the growing heat and increasingly unpredictable weather patterns?

- How will our *health care system* cope with an expected increase in cases of heat stress, summer asthma and warm-climate diseases, such as Lyme disease, West Nile virus and malaria?
- How will our *agricultural sector* respond to a longer growing season, shifting precipitation patterns and droughts, and the influx of new warm-weather pests and weeds into Ontario?
- How will our *energy sector* meet the heavy demand for summer air conditioning or counter the threat of winter ice storms?
- How will our *shipping and fisheries* sectors cope with the expected one-metre drop in Great Lakes water levels?
- How will *northern communities* maintain winter ice roads, and respond to losses of permafrost, changing surface hydrology, and stresses to the boreal forest and wetlands?

Emission reduction efforts notwithstanding, adaptation strategies must be developed in order to prepare society, the economy and the natural environment for the unavoidable changes that are predicted. Adaptation cannot stop climate change from happening, but it can help contain the negative impacts.

In recognition of the adaptation challenge, in 2007 the Ontario government directed the Expert Panel on Climate Change Adaptation to provide advice and direction on how to minimize the negative impacts of a changing climate. In 2009, the Panel issued 59 recommendations in such diverse areas as public health, environment, infrastructure and the economy.[3] Having

concluded that the initial effects of climate change are already being felt, the Panel urged the government to respond with "prompt and vigorous action."[4] In particular, a key Panel recommendation was for the government to take immediate steps to develop a province-wide climate change adaptation plan.

In April 2011, the government responded by releasing Climate Ready: Ontario's Adaptation Strategy and Action Plan, 2011-2014 ("Climate Ready").[5] According to the strategy, the province should prepare for "the impacts of a changing climate through implementation of policies and programs that minimize risks to our health and safety, the environment and the economy, and maximize[] the benefits from opportunities which may arise."[6] In order to achieve this vision, the strategy outlines five broad climate change adaptation imperatives:

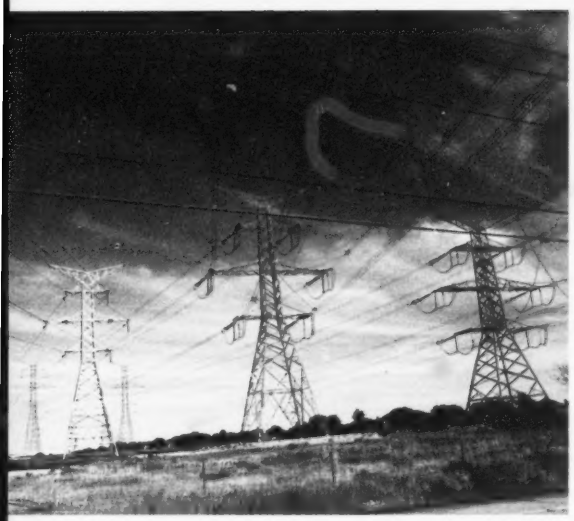
Goal 1 Avoid loss and unsustainable investment, and take advantage of new economic opportunities.

Goal 2 Take all reasonable and practical measures to increase climate resilience of ecosystems.

Goal 3 Create and share risk-management tools to support adaptation efforts across the province.

Goal 4 Achieve a better understanding of future climate change impacts across the province.

Goal 5 Seek opportunities to collaborate with others.



To help achieve these five goals, two broad overarching actions have been identified. The first (Action 1, Appendix) calls for the "mainstreaming" of climate change adaptation into every part of the provincial government. According to Climate Ready mainstreaming means "making sure that legislation, policies and programs are modified to consider climate change adaptation when necessary." This will require "adaptive efforts from every part of the provincial government."[7]

In line with a key recommendation of the Expert Panel, the second broad action (Action 2) calls for the establishment of a Climate Change Adaptation Directorate to serve as the main driver of the adaptation plan and strategy. In addition to serving as the lead for new policy initiatives, the Directorate would: report annually to the public on actions contained within the plan; develop a risk-management framework to guide decision making; and undertake or co-ordinate province-wide economic and climate impact studies. Along with these two broad actions, the government identified 35 additional, more specific actions covering a wide range of issues and sectors (see Appendix for a list of these actions).

Since the release of Climate Ready, the Environmental Commissioner of Ontario (ECO) has been encouraged to learn that progress has been made on a number of the action items identified within the strategy. The implementation of specific Climate Ready actions will be reviewed in future ECO reports. At this preliminary stage, however, the ECO believes that Climate Ready represents a relatively comprehensive adaptation strategy; this stands in stark contrast to the government's continued challenges in identifying and implementing initiatives for its mitigation strategy. The ECO believes that a comprehensive climate change strategy must incorporate both adaptation measures to accommodate those changes in climate that we know to be coming, as well as abatement measures that reduce greenhouse gas emissions and decarbonize the economy.

The ECO believes that Climate Ready represents a significant contribution towards a growing national and international policy movement designed to better prepare us for the anticipated impacts of climate change. Ontario is among a number of other Canadian jurisdictions – provincial and territorial – that have begun to develop and implement formal climate change adaptation strategies and programs.[8] The ultimate goal is to "climate-proof" their decision-making processes, programs and policies. For its efforts, the Ontario government should be strongly commended.

ASSESSING THE STRATEGY

The ECO's vision of a successful adaptation strategy is one that:

- describes decisive actions and prioritizes them for implementation;
- details the responsibilities of all relevant ministries;
- contains quantifiable targets and specific timelines for delivery; and
- identifies program areas, policies and legislation that need to be revised to achieve the strategy's goals.

In essence, a successful strategy should focus on what new things need to be done, as well as look for ways to improve those actions already underway. What follows are the ECO's observations on how Climate Ready measures up against this vision of a successful adaptation strategy.

Does the strategy describe a series of decisive actions and prioritize them for implementation?

Climate Ready identifies decisive actions to address adaptation needs in Ontario, but fails to clearly indicate how these will be prioritized for implementation over the four-year timeframe of the strategy. As such, Climate Ready presents an inventory of Ontario government actions rather than a strategic plan to achieve priority adaptation objectives across the province. In the ECO's view, the lack of a clear methodology for prioritization of actions represents a weakness in the Climate Ready strategy.

Despite this, Climate Ready does address important adaptation needs in the province. For example, there is a need for local-level information about how climate change impacts will be manifested. In the absence of such information, local decision making is constrained and vulnerabilities remain unaddressed. The ECO strongly supports the Ministry of the Environment's (MOE) investments in climate change modelling (Action 33) to provide more detailed information about climate change impacts.

The information gleaned from intensive modelling will facilitate further actions identified in Climate Ready, namely conducting four vulnerability assessments on forest ecosystems (Action 17), fish populations (Action 19), Lake Simcoe (Action 20), and infrastructure (focused on buildings and municipal stormwater and wastewater infrastructure) (Action 6). The ECO looks forward to the completion of such assessments and expects that the new information will be incorporated into future adaptation planning.

While information obtained through more localized modelling and vulnerability assessments will be useful in informing provincial adaptation initiatives, it will need to be communicated to local communities and decision makers so they can make informed adaptive decisions. In this regard, the ECO is pleased that funding was provided by MOE for the Community Adaptation Initiative. The purpose of this initiative is to engage practitioners in five at-risk sectors – public health, urban forestry, electricity, high-rise residential buildings, and emergency management and critical infrastructure – in a discussion about the impacts of climate change. The Ontario Regional Adaptation Collaborative – a joint federal-provincial program – also includes an outreach and capacity-building component that has delivered workshops and web-based tools to facilitate decision making at the community level. Unfortunately, provincial funding for both initiatives is set to expire in March 2012,[9,10] and the ECO sees the need for a renewed provincial commitment to capacity building at the local level.

Does the strategy detail the responsibilities of all relevant government ministries?

While Climate Ready indicates that climate change adaptation will be a required key consideration of every part of government, it specifies actions for only ten Ontario ministries. Notably absent is the Ministry of Energy. Given that the first goal of Climate Ready is to avoid loss and unsustainable investment, the ECO is concerned that a ministry with responsibility for guiding the planning of costly and potentially vulnerable energy supply and delivery infrastructure investments is not given lead responsibility for any actions within the strategy.

It is also surprising that the Ministry of Economic Development and Innovation is not mentioned, given that climate change introduces new risks and opportunities for Ontario's strategic economic sectors, such as clean technology.

Finally, the ECO expected to see more responsibility assigned to the Ministry of Northern Development and Mines (MNDM), given the changes in temperature and precipitation patterns that are already occurring in northern Ontario. There is a vague commitment to "strengthen the winter road network" (Action 11) – which is already an annual activity – and to "consider climate change in the Growth Plan for Northern Ontario" (Action 23). However, Climate Ready does not detail the responsibility that MNDM will have in addressing challenges presented by the rapid and more extensive changes expected in the north.

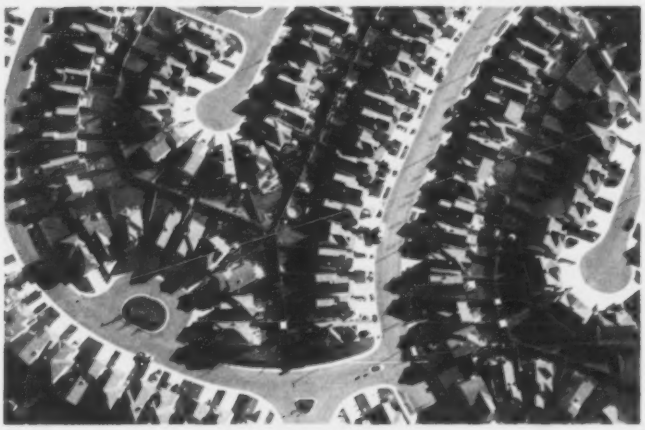
Does the strategy quantify targets or set specific timelines for delivery?

One weakness that the ECO has identified in Climate Ready is that the strategy contains few quantitative or qualitative targets or specific timelines for delivery. The ECO recognizes that adaptation to climate change will be a long-term effort and that particular actions will continue to develop and evolve. Nevertheless, as the Expert Panel stressed, timelines for action items are an important part of a comprehensive strategy. As such the ECO expects to see the development and public reporting of success indicators, targets and timelines. With these in place, the government will be in a position to measure and annually report on progress made.

Does the strategy identify program areas, policies and legislation that require revision?

Climate Ready has properly identified several program areas that are in need of revision to incorporate climate change adaptation considerations. MNR's commitment to review the Ontario Low Water Response Program (Action 4) is a good example. The ECO has raised concerns in the past regarding the effectiveness of this program and the need for changes that allow for better management in low water conditions.[11]

The ECO has also recently expressed concerns about the status of Ontario's Biodiversity Strategy.[12] Contrary to what is implied in Climate Ready (Action 16), Ontario currently lacks a strategy that outlines the government's commitment to conserve biodiversity; its formal strategy expired in 2010. In the face of the changes that MNR is predicting due to climate change there is an urgency to move forward on this file.



Another policy area that has been identified for attention within Climate Ready relates to the Provincial Policy Statement (PPS) – a document that sets policy direction for local and provincial land use planning. Land use planning is a critical mechanism for implementing climate change adaptation at the municipal level. In recognition of this, the Expert Panel recommended that the Ministry of Municipal Affairs and Housing should, in revising the PPS, include a firm direction that "all planning authorities ... take into account risks arising from climate change."[13] At the time of writing, the PPS was still under review; however, the ECO expects to see such firm direction given to planning authorities within the final PPS document.

In light of future projections, one provincial policy area that the ECO believes deserves particular attention is the overall electricity system – a critical part of provincial infrastructure. Following the devastating ice storm of 1998, Ontarians witnessed firsthand how vulnerable the province's electricity transmission and distribution grid could be in the face of a severe weather event.[14] Not only are such single events – like ice, heavy snow and wind storms – predicted to occur more frequently and with increased severity (particularly in the southern region of the province),[15] other long-term changes, such as altered water levels, are also forecast and could affect the reliability of Ontario's electricity supply. For example, a predicted long-term decline in Great Lakes water levels could reduce baseload hydroelectric capacity by more than 1,100 megawatts.[16] Additionally, peak electricity capacity – which is often contributed by Ontario's smaller hydro generating stations – could be reduced by low flow situations during high demand periods. These projections increase the urgency for aggressively pursuing energy conservation in Ontario.

The Expert Panel clearly felt that a climate change risk assessment of the province-wide electricity grid was an action that required some degree of urgency and called for this assessment to be completed by the end of 2012.[17] More than two years following the release of the Expert Panel report, this concern remains largely unaddressed.

While an overall assessment is still clearly felt to be necessary, a key player on the electricity generation side – Ontario Power Generation (OPG) – has begun planning for a changing climate, and the longer-term impacts that are forecast.[18] The ECO applauds OPG for beginning to consider its climate change vulnerabilities, but reiterates the call made by the Expert Panel for the Ministry of Energy to initiate a climate change risk assessment in partnership with other energy agencies, such as the Ontario Power Authority, Hydro One and local distribution companies.

In a similar vein, the ECO believes that the vulnerabilities faced by the province's natural gas transmission and distribution network should be addressed. While most of this infrastructure is buried, it is still vulnerable. The August 2005 rainstorm in Toronto revealed such vulnerability when two high-pressure gas mains were left suspended in mid-air over a length of about 20 metres following a storm surge that washed out Finch Avenue. The ECO accepts that the natural gas transmission and distribution companies in Ontario adhere to best practices in the design, siting and ongoing maintenance of this infrastructure. However, recent failures of energy pipeline infrastructure elsewhere in North America suggest that more oversight from the province would help ensure that extreme meteorological events do not compromise this vital infrastructure.

FUNDING THE STRATEGY

Climate change adaptation comes with a cost which, according to the UK-commissioned Stern Report on the economics of climate change, will be much higher in the future if we don't take action now.[19] Many costs, such as adapting office buildings, factories and homes, and paying increased insurance premiums, will be borne by private businesses and individuals. The costs of adaptation will also present a significant challenge to the Ontario government, especially given the fiscal constraints it faces. However, there is an opportunity to realign existing budgets by mainstreaming adaptation across ministries so that these costs are more manageable.

As one of its five key recommendations, the Expert Panel indicated that dedicated funding will be needed for particular activities. However, the ECO is disappointed that the issue of funding warrants little discussion in Climate Ready. In order to finance Ontario's public adaptation efforts, the government will need to realign existing fiscal mechanisms (i.e., tax incentives and budgetary expenditures) and secure new sources of funding. Some jurisdictions, such as Quebec, have funded their adaptation strategies through the use of carbon pricing revenues.[20] Quebec currently collects more than $200 million annually from its carbon tax, which will increase to more than $1 billion when the province's cap-and-trade program comes into full effect in 2015.[21] This provides a significant pool of funds from which to draw for both mitigation and adaptation initiatives.

MEETING *EBR* OBLIGATIONS

While Climate Ready constitutes an environmentally significant policy proposal as defined by Part I of the *Environmental Bill of Rights, 1993 (EBR)*, it was posted on the Environmental Registry as an information notice only.[22] The ECO believes that it should have been posted as a policy proposal in recognition of its environmental policy significance. By positioning it as an information notice on the Environmental Registry, MOE denied the public an opportunity to participate in its development.

While the ECO recognizes that significant consultation underlay the Expert Panel's report that informed Climate Ready, this consultation was almost exclusively conducted with senior level government managers from several provincial ministries and government agencies[23] rather than with the general public. Not only was the consultation mainly limited to government representatives, it was undertaken by the Expert Panel for the purposes of developing the Panel's report, not for developing Climate Ready – which represents government policy. Limited and non-public consultation by the Panel on a separate document in no way satisfies MOE's *EBR* obligation to publicly consult. Failure to properly post the document as a policy proposal on the Registry resulted in less public accountability and transparency on a significant policy initiative. This also deprived the government of an opportunity to educate and engage the public about this important environmental policy initiative.

As a natural outcome of the work undertaken by the Expert Panel, Climate Ready represents the next logical step in moving forward on provincial adaptation efforts and identifies those policies and programs that must be adapted to meet the coming changes. Going forward, the ECO expects to see more details regarding key policies and programs that will implement this strategy. Consistent with the obligations contained within the *EBR*, the ECO fully expects that the public will be given an opportunity to participate in their development and comment on them through the Environmental Registry.

HOW THE ECO WILL EVALUATE PERFORMANCE

As the government moves forward with policy development and implementation under its climate change adaptation strategy, it is critical that it develop indicators and metrics to track progress towards the goals outlined in Climate Ready. The ECO will use the following five criteria[24] to evaluate the government's performance. This will include a focus on the government's efforts in building adaptive capacity across the province. Table 1 provides examples of the types of questions that will guide future ECO reviews.

Criterion #1: Government commitment and strategic vision

Government commitment is expressed through public statements, legislation, policy directives and the development of implementation plans. Public transparency and regular reporting are critical elements that demonstrate such commitment. The ECO will assess the level of commitment to adaptation on the basis of whether the strategy: is sustained over time; engages the public; and incorporates medium- and long-term policy objectives, targets and timetables, and mechanisms to monitor implementation.

Criterion #2: Administrative culture and practices

Integrating climate change adaptation into government structures requires adjustments in the culture and practice of ministries with roles, responsibilities and accountabilities for strategic objectives clearly defined. In this regard, the ECO will assess changes in ministry planning processes and resulting budget commitments with a view to determining whether such integration has occurred. The ECO will also assess the effectiveness of decision-making bodies or structures

that are created to govern, support, communicate and co-ordinate the delivery of strategic objectives across ministries.

Criterion #3: Consultation to underpin decision making

Governmental decision making is strengthened through the use of public consultation. Involvement of the public throughout the process helps to increase public understanding and builds support for governmental efforts. The ECO will assess the quality of public consultation used in future decision-making processes relating to climate change adaptation.

Criterion #4: Use of policy instruments

A wide range of policy tools will need to be employed, beyond traditional command and control measures. Among others, these could include fiscal policy,[25] land use planning, public education, and government subsidies. The government will also need to align its policies so that the insurance risks arising from climate change impacts are properly apportioned between the public and private sectors. The ECO will assess the degree to which the government is making use of the appropriate policy instruments, as well as the efficacy of the policy mix, in contributing to short- and long-term solutions across vulnerable sectors.

Criterion #5: Monitoring and policy learning

Successful integration of adaptation will require monitoring mechanisms that track the allocation of resources and outcomes. The ECO has previously discussed the critical importance that program monitoring and evaluation plays in the policy learning process[26] and will assess whether such mechanisms are in place to facilitate such learning within government.

Table 1: Criteria for evaluating the government's performance in implementing its climate change adaptation strategy

Criteria	Questions
Government commitment and strategic vision	• Has there been progress towards the integration of adaptation across ministries? Has there been ongoing direction from Cabinet in support of the adaptation strategy? • Have medium- and long-term policy objectives, targets and timetables, and mechanisms to monitor implementation been developed? Has there been regular reporting?
Administrative culture and practices	• Have the government's budgetary and planning processes been changed to reflect adaptation priorities? • Has an entity charged with co-ordinating adaptation efforts across ministries been established? Has this entity been given sufficient power to exercise its mandate? • Have mechanisms for co-operation with higher or lower levels of government been established?
Consultation to underpin decision making	• Has the public been properly consulted during the policy-making process? Did the government take into account public concerns or comments in reaching its decisions? • Has climate information been made available to the public in order to facilitate its participation in the decision-making process?
Use of policy instruments	• Has the government employed a wide range of policy measures? Are these the appropriate tools? • Has land use planning effectively integrated adaptation issues? • Has the Building Code effectively integrated adaptation issues? • Have new instruments been deployed to support adaptation integration across ministries?
Monitoring and policy learning	• Have monitoring mechanisms been put in place to adequately track progress towards objectives and targets? • Is there a process to evaluate the effectiveness of policies that have been put in place?

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APPENDIX

Climate Ready's Five Goals and 37 Actions

Source: Government of Ontario, *Climate Ready: Ontario's Adaptation Strategy and Action Plan 2011-2014* (Queen's Printer for Ontario, 2011).

VISION

A province prepared for the impacts of a changing climate through implementation of policies and programs that minimize risks to our health and safety, the environment and the economy, and maximizes the benefits from opportunities which may arise.

GOAL 1

Avoid loss and unsustainable investment, and take advantage of new economic opportunities.

GOAL 2

Take all reasonable and practical measures to increase climate resilience of ecosystems.

GOAL 3

Create and share risk-management tools to support adaptation efforts across the province.

GOAL 4

Achieve a better understanding of future climate change impacts across the province.

GOAL 5

Seek opportunities to collaborate with others.

Cross-cutting Actions

Action 1: Require Consideration of Climate Change Adaptation

Action 2: Establish a Climate Change Adaptation Directorate

Action 3: Promote Water Conservation

Action 4: Review the Ontario Low Water Response Program

Action 5: Consider Climate Change Impacts in the Building Code

Action 6: Undertake Infrastructure Vulnerability Assessments

Action 7: Build Climate Change Adaptation into Ontario's 10-Year Infrastructure Plan

Action 8: Integrate Climate Change Impacts into the Environmental Assessment Process

Action 9: Integrate Adaptive Solutions into Drinking Water Management

Action 10: Develop Guidance for Stormwater Management

Action 11: Strengthen the Winter Road Network

Action 12: Protect Animal Health

Action 13: Protect Plant Health

Action 14: Encourage Business Risk-Management Approaches

Action 15: Pilot Adaptation Strategies in the Tourism Sector

Action 16: Conserve Biodiversity and Support Resilient Ecosystems

Action 17: Undertake Forest Adaptation Assessment

Action 18: Build Adaptation into the Great Lakes Agreements

- Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement
- Canada-U.S. Great Lakes Water Quality Agreement
- Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA)

Action 19: Examine Climate Change Impacts on Fisheries

Action 20: Develop the Lake Simcoe Adaptation Strategy

Action 21: Increase Awareness of Land use Planning Tools

Action 22: Integrate Adaptation Policies into the Provincial Policy Statement

Action 23: Consider Climate Change in the Growth Plan for Northern Ontario

Action 24: Raise Awareness about Health Hazards of Climate Change

Action 25: Raise Public Awareness of Lyme Disease

Action 26: Update Intensity-Duration-Frequency Curves

Action 27: Update the Environmental Farm Plan Program

Action 28: Provide Community Outreach and Training

Action 29: Develop the Far North Land use Strategy

Action 30: Incorporate Climate Change into Curriculum

Action 31: Enhance Climate-Related Monitoring

- Water Quality
- Water Quantity
- Natural Resources
- Forests
- Land Cover
- Far North
- Agriculture

Action 32: Undertake Climate Impact Indicators Study

Action 33: Undertake Research Partnerships for Climate Modelling

Action 34: Establish an OPS Climate Modelling Collaborative

Action 35: Establish and Lead Ontario's Regional Adaptation Collaborative

- Developing a Municipal Risk-Management Tool
- Developing Guidance for Building Retrofits
- Creating a Heat Vulnerability Tool
- Integrating Climate Impacts into the Source Protection Framework
- Developing a Weather and Water Information Gateway
- Providing Community Outreach and Training

Action 36: Work with Canadian Council of Ministers of the Environment and Canadian Council of Forest Ministers

Action 37: Participate in the Territorial Approach to Climate Change (United Nations Development Programme)

Future Vision

ENDNOTES

[1] Colombo, S.J., et al., *Climate Change Projections for Ontario: Practical Information for Policymakers and Planners*, Climate Change Research Report (CCRR) #05, Ontario Ministry of Natural Resources, Applied Research and Development Branch, (Sault Ste. Marie, Queen's Printer for Ontario: 2007); Varrin, R., et al., *The Known and Potential Effects of Climate Change on Biodiversity in Ontario's Terrestrial Ecosystems: Case Studies and Recommendations for Adaptation*, CCRR #09, Ontario Ministry of Natural Resources, Applied Research and Development Branch, (Sault Ste. Marie, Queen's Printer for Ontario: 2007).

[2] McKenney, D.W., et al., *Current and Projected Future Climatic Conditions for Ecoregions and Selected Natural Heritage Areas in Ontario*, CCRR #16, Ontario Ministry of Natural Resources, Applied Research and Development Branch, (Sault Ste. Marie, Queen's Printer for Ontario: 2010).

[3] Expert Panel on *Climate Change Adaptation: Report to the Minister of the Environment, Adapting to Climate Change in Ontario: Towards the Design and Implementation of a Strategy and Action Plan* (Queen's Printer for Ontario: November 2009).

[4] Ibid., 1.

[5] Government of Ontario, *Climate Ready: Ontario's Adaptation Strategy and Action Plan 2011-2014* (Queen's Printer for Ontario, 2011).

[6] Ibid., 19.

[7] Ibid., 22.

[8] See for example: Government of Quebec, *Quebec and Climate Change—A Challenge for the Future* (2006-2012 Action Plan) June 2008 (http://www.mddep.gouv.qc.ca/changements/plan_action/index-mesures-en.htm); Alberta's Climate Change Adaptation Framework (http://www.srd.alberta.ca/MapsPhotosPublications/Publications/ClimateChangeAdaptationFramework.aspx); Government of British Columbia, *British Columbia Climate Action for the 21st Century* (http://www.env.gov.bc.ca/cas/adaptation/strategy.html); Prairie Adaptation Research Collaborative, *SaskAdapt* (http://www.parc.ca/saskadapt/); Government of New Brunswick, *Climate Change Action Plan 2007-2012* (http://www.gnb.ca/0009/0369/0015/0002-e.asp); Nova Scotia Environment, *Nova Scotia's Climate Change Action Plan*. January 2009. (http://www.climatechange.gov.ns.ca/content/adapt); *Climate Change Adaptation Strategy for Atlantic Canada*, Atlantic Environment Ministers Meeting 2008, (www.gnb.ca/0009/0369/0018/0002-e.pdf); *Pan-Territorial Adaptation Strategy—Moving forward on climate adaptation in Canada's north* (http://www.anorthernvision.ca/documents/Pan-TerritorialAdaptationStrategyEN.pdf).

[9] The Community Adaptation Initiative is a two-year $440,000 provincial project that began in spring 2010. http://www.ene.gov.on.ca/environment/en/funding/community_adaptation_initiative/index.htm.

[10] The Ontario Regional Adaptation Collaborative, a provincial-federal partnership, was formally launched in January 2011.According to media releases, the federal government provided $3.3 million of the $6.8 million for this program. As of writing, the end date for this program is March 2012.

[11] Environmental Commissioner of Ontario, "Drought in Ontario? Groundwater and Surface Water Impacts and Response," *Getting to K(no)w: Annual Report* 2007-2008 (Toronto, ON: 2008), 49-57.

[12] Environmental Commissioner of Ontario, *Biodiversity: A Nation's Commitment, An Obligation for Ontario*, Special Report to the Legislative Assembly of Ontario (Toronto, ON: 2012).

[13] See Supra 3, 62.

[14] The storm caused extensive power outages, impacting more than 4.7 million people, or 16 per cent of the Canadian population. In Ontario, repairs were required for over 11,000 hydro poles, 1,000 transformers, and 300 steel towers. Risk Management Solutions, *The 1998 Ice Storm: 10-Year Retrospective* (2008), 7.

[15] Government of Canada, *From Impacts to Adaptation: Canada in a Changing Climate 2007*, (Ottawa: Climate Change Impacts and Adaptation Division: 2008), 252.

[16] Ibid.

[17] See Supra 3, 39.

[18] Ontario Power Generation, *Sustainable Development Report 2010*, 16.

APPENDIX

Climate Ready's Five Goals and 37 Actions

Source: Government of Ontario, *Climate Ready: Ontario's Adaptation Strategy and Action Plan 2011-2014* (Queen's Printer for Ontario, 2011).

VISION

A province prepared for the impacts of a changing climate through implementation of policies and programs that minimize risks to our health and safety, the environment and the economy, and maximizes the benefits from opportunities which may arise.

GOAL 1

Avoid loss and unsustainable investment, and take advantage of new economic opportunities.

GOAL 2

Take all reasonable and practical measures to increase climate resilience of ecosystems.

GOAL 3

Create and share risk-management tools to support adaptation efforts across the province.

GOAL 4

Achieve a better understanding of future climate change impacts across the province.

GOAL 5

Seek opportunities to collaborate with others.

Action 1: Require Consideration of Climate Change Adaptation

Action 2: Establish a Climate Change Adaptation Directorate

Cross-cutting Actions

Action 3: Promote Water Conservation

Action 4: Review the Ontario Low Water Response Program

Action 5: Consider Climate Change Impacts in the Building Code

Action 6: Undertake Infrastructure Vulnerability Assessments

Action 7: Build Climate Change Adaptation into Ontario's 10-Year Infrastructure Plan

Action 8: Integrate Climate Change Impacts into the Environmental Assessment Process

Action 9: Integrate Adaptive Solutions into Drinking Water Management

Action 10: Develop Guidance for Stormwater Management

Action 11: Strengthen the Winter Road Network

Action 12: Protect Animal Health

Action 13: Protect Plant Health

Action 14: Encourage Business Risk-Management Approaches

Action 15: Pilot Adaptation Strategies in the Tourism Sector

Action 16: Conserve Biodiversity and Support Resilient Ecosystems

Action 17: Undertake Forest Adaptation Assessment

Action 18: Build Adaptation into the Great Lakes Agreements

- Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement
- Canada-U.S. Great Lakes Water Quality Agreement
- Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA)

Action 19: Examine Climate Change Impacts on Fisheries

Action 20: Develop the Lake Simcoe Adaptation Strategy

Action 21: Increase Awareness of Land use Planning Tools

Action 22: Integrate Adaptation Policies into the Provincial Policy Statement

Action 23: Consider Climate Change in the Growth Plan for Northern Ontario

Action 24: Raise Awareness about Health Hazards of Climate Change

Action 25: Raise Public Awareness of Lyme Disease

Action 26: Update Intensity-Duration-Frequency Curves

Action 27: Update the Environmental Farm Plan Program

Action 28: Provide Community Outreach and Training

Action 29: Develop the Far North Land use Strategy

Action 30: Incorporate Climate Change into Curriculum

Action 31: Enhance Climate-Related Monitoring

- Water Quality
- Water Quantity
- Natural Resources
- Forests
- Land Cover
- Far North
- Agriculture

Action 32: Undertake Climate Impact Indicators Study

Action 33: Undertake Research Partnerships for Climate Modelling

Action 34: Establish an OPS Climate Modelling Collaborative

Action 35: Establish and Lead Ontario's Regional Adaptation Collaborative

- Developing a Municipal Risk-Management Tool
- Developing Guidance for Building Retrofits
- Creating a Heat Vulnerability Tool
- Integrating Climate Impacts into the Source Protection Framework
- Developing a Weather and Water Information Gateway
- Providing Community Outreach and Training

Action 36: Work with Canadian Council of Ministers of the Environment and Canadian Council of Forest Ministers

Action 37: Participate in the Territorial Approach to Climate Change (United Nations Development Programme)

Future Vision

ENDNOTES

[1] Colombo, S.J., et al., *Climate Change Projections for Ontario: Practical Information for Policymakers and Planners*, Climate Change Research Report (CCRR) #05, Ontario Ministry of Natural Resources, Applied Research and Development Branch, (Sault Ste. Marie, Queen's Printer for Ontario: 2007); Varrin, R., et al., *The Known and Potential Effects of Climate Change on Biodiversity in Ontario's Terrestrial Ecosystems: Case Studies and Recommendations for Adaptation*, CCRR #09, Ontario Ministry of Natural Resources, Applied Research and Development Branch, (Sault Ste. Marie, Queen's Printer for Ontario: 2007).

[2] McKenney, D.W., et al., *Current and Projected Future Climatic Conditions for Ecoregions and Selected Natural Heritage Areas in Ontario*, CCRR #16, Ontario Ministry of Natural Resources, Applied Research and Development Branch, (Sault Ste. Marie, Queen's Printer for Ontario: 2010).

[3] Expert Panel on *Climate Change Adaptation: Report to the Minister of the Environment, Adapting to Climate Change in Ontario: Towards the Design and Implementation of a Strategy and Action Plan* (Queen's Printer for Ontario: November 2009).

[4] Ibid., 1.

[5] Government of Ontario, *Climate Ready: Ontario's Adaptation Strategy and Action Plan 2011-2014* (Queen's Printer for Ontario, 2011).

[6] Ibid., 19.

[7] Ibid., 22.

[8] See for example: Government of Quebec, *Quebec and Climate Change—A Challenge for the Future* (2006-2012 Action Plan) June 2008 (http://www.mddep.gouv.qc.ca/changements/plan_action/index-mesures-en.htm); Alberta's Climate Change Adaptation Framework (http://www.srd.alberta.ca/MapsPhotosPublications/Publications/ClimateChangeAdaptationFramework.aspx); Government of British Columbia, *British Columbia Climate Action for the 21st Century* (http://www.env.gov.bc.ca/cas/adaptation/strategy.html); Prairie Adaptation Research Collaborative, *SaskAdapt* (http://www.parc.ca/saskadapt/); Government of New Brunswick, *Climate Change Action Plan 2007-2012* (http://www.gnb.ca/0009/0369/0015/0002-e.asp); Nova Scotia Environment, *Nova Scotia's Climate Change Action Plan*. January 2009. (http://www.climatechange.gov.ns.ca/content/adapt); *Climate Change Adaptation Strategy for Atlantic Canada*, Atlantic Environment Ministers Meeting 2008, (www.gnb.ca/0009/0369/0018/0002-e.pdf); *Pan-Territorial Adaptation Strategy—Moving forward on climate adaptation in Canada's north* (http://www.anorthernvision.ca/documents/Pan-TerritorialAdaptationStrategyEN.pdf).

[9] The Community Adaptation Initiative is a two-year $440,000 provincial project that began in spring 2010. http://www.ene.gov.on.ca/environment/en/funding/community_adaptation_initiative/index.htm.

[10] The Ontario Regional Adaptation Collaborative, a provincial-federal partnership, was formally launched in January 2011.According to media releases, the federal government provided $3.3 million of the $6.8 million for this program. As of writing, the end date for this program is March 2012.

[11] Environmental Commissioner of Ontario, "Drought in Ontario? Groundwater and Surface Water Impacts and Response," *Getting to K(no)w: Annual Report* 2007-2008 (Toronto, ON: 2008), 49-57.

[12] Environmental Commissioner of Ontario, *Biodiversity: A Nation's Commitment, An Obligation for Ontario*, Special Report to the Legislative Assembly of Ontario (Toronto, ON: 2012).

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[18] Ontario Power Generation, *Sustainable Development Report 2010*, 16.

[19] Sir Nicholas Stern, *The Economics of Climate Change: The Stern Review*. Cabinet Office – HM Treasury (Cambridge: Cambridge University Press: 2007).

[20] Government of Quebec, *2006-2012 Climate Change Action Plan Fifth Annual Report: Keeping Quebec on Track*. (Quebec: 2011), 9.

[21] As reported by Pierre Arcand, Quebec Minister of Sustainable Development, Environment and Parks, at the Climate Action Network Conference in Montreal, 1-2 November, 2011.

[22] EBR Registry Number 011-3299, loaded to the Registry April 29, 2011; http://www.ebr.gov.on.ca/ERS-WEB-External/displaynoticecontent.do?noticeId=MTEzMDAx&statusId=MTY5NDQ2&language=en.

[23] See Supra 3, 3.

[24] Adapted from European Environment Agency, *Environmental Policy Integration in Europe: State of play and evaluation framework*. EEA Technical report No. 2 (2005).

[25] Monetizing externalities is one fiscal tool that should be assessed.

[26] Environmental Commissioner of Ontario, *Annual Greenhouse Gas Progress Report 2008/2009: Finding a Vision for Change* (Toronto, ON: 2009), 26.

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